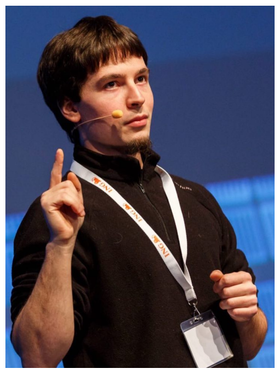
Harness Your Routing Super-Hero Power In Kubernetes With Traefik, Maesh And Konvoy

How To Access These Slides?

- Slides (HTML): https://containous.github.io/slides/d2iq-virtual-event
- Slides (PDF): https://containous.github.io/slides/d2iq-virtual-event/slides.pdf
- Source on : https://github.com/containous/slides/tree/d2iq-virtual-event

Whoami

- Damien DUPORTAL:
  - Træfik's Developer 🥑 Advocate @ Containous
- @DamienDuportal
- dduportal



https://containo.us

- We Believe in Open Source
- We Deliver Traefik, Traefik Enterprise Edition and Maesh
- Commercial Support
- 30 people distributed, 90% tech
- We are hiring!

```
docker run -it containous/jobs
```

Why Konvoy?

D2IQ

- Formerly known as Mesosphere
- "Day-Two-I-Q"
- A smarter approach to "Day 2 Operations"

Day 2 Operations

"Day 2" refers to the phase of the development lifecycle that follows initial deployment where the real application demands exist.

KSphere

Embrace Kubernetes when:

- Beginning your journey
- Preparing for Day 2

KSphere Offer

- Technical Solutions:
  - Konvoy
  - MKE (Mesosphere Kubernetes Engine)
- Services:
  - Professionnal Services
  - Training
  - Support

What Is Konvoy?

A packaged 📦 Kubernetes ☸ with integrated operational services 🛠️.

Why Using Konvoy?

- Gain Flexibility Across Any Infrastructure
- Manage Operations With Ease
- Ensure Rapid Technology Adoption and Scale
- Harness Premiere Domain Expertise

Konvoy

Konvoy Concepts

- Standalone **Native** Distribution of Kubernetes
- "One button push" User Experience
- Packaged with a set of services for **Operations**

Konvoy Architecture

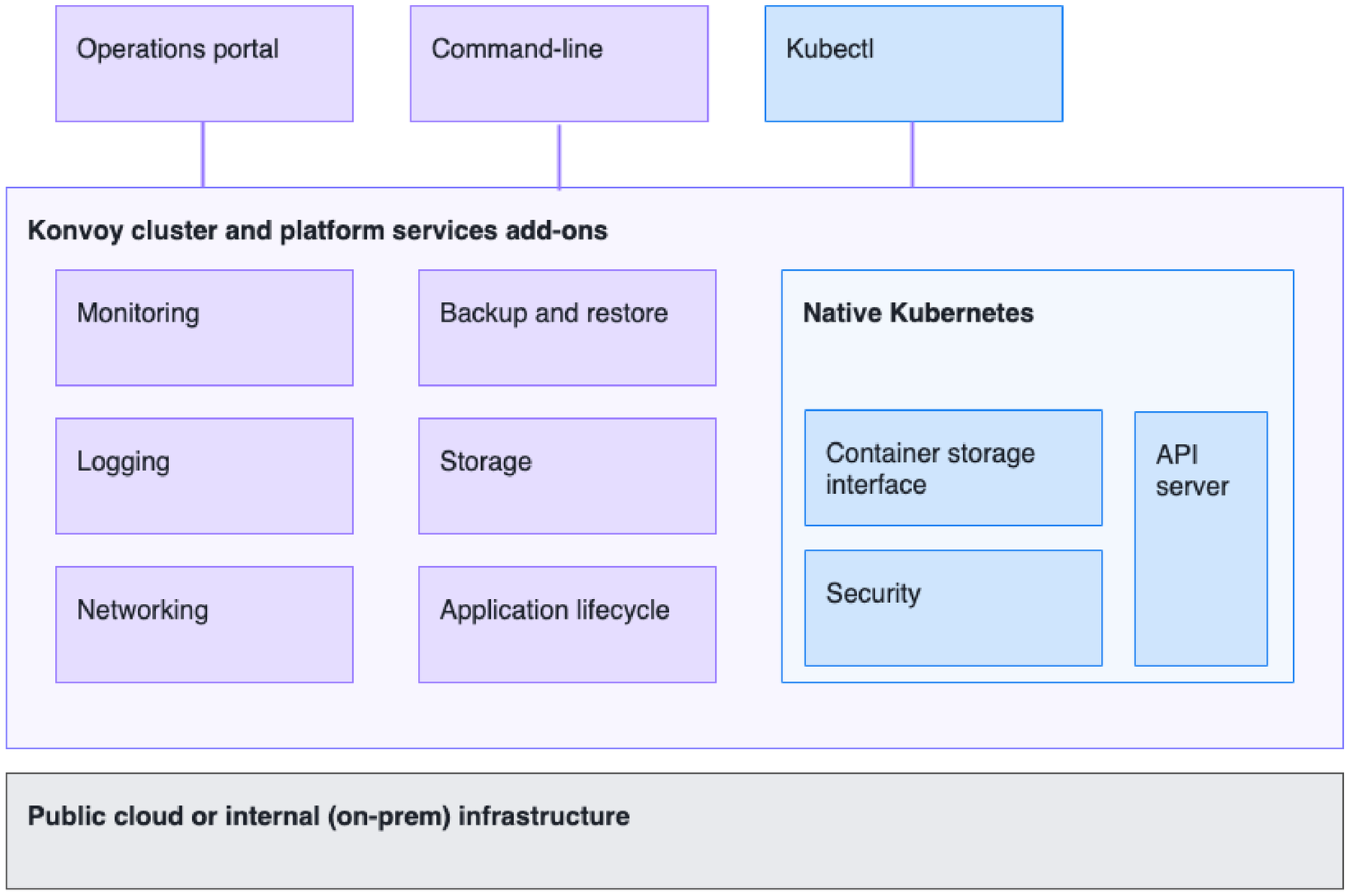


Diagram form Konvoy Documentation

Quick Start

Install a Konvoy Cluster in AWS EC2:

- Prepare installation:

```
$ konvoy init --provisioner=aws
```

- Run installation:

```
$ konvoy up
```

- Use it:

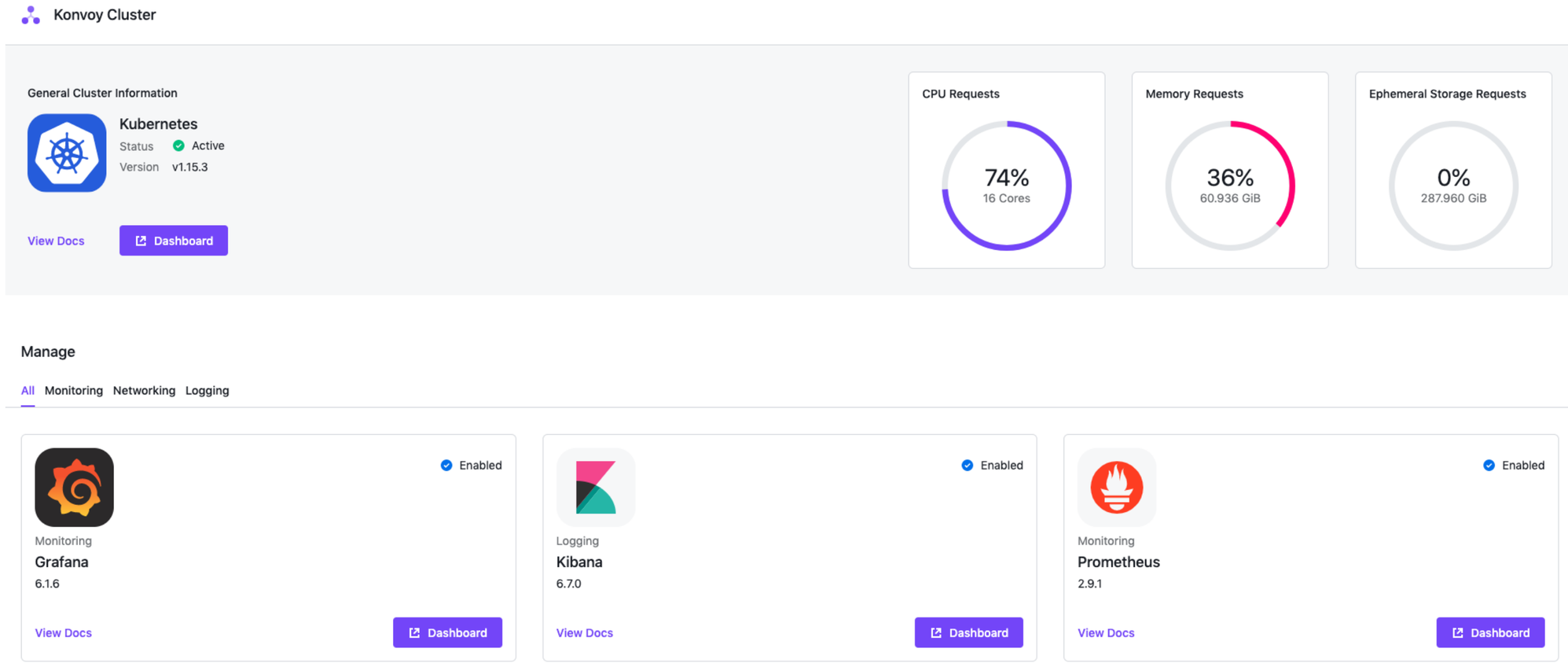
```
$ konvoy apply kubeconfig && kubectl cluster-info

Kubernetes master is running at (...)
KubeDNS is running at (...)
kubernetes-dashboard is running at (...)
```

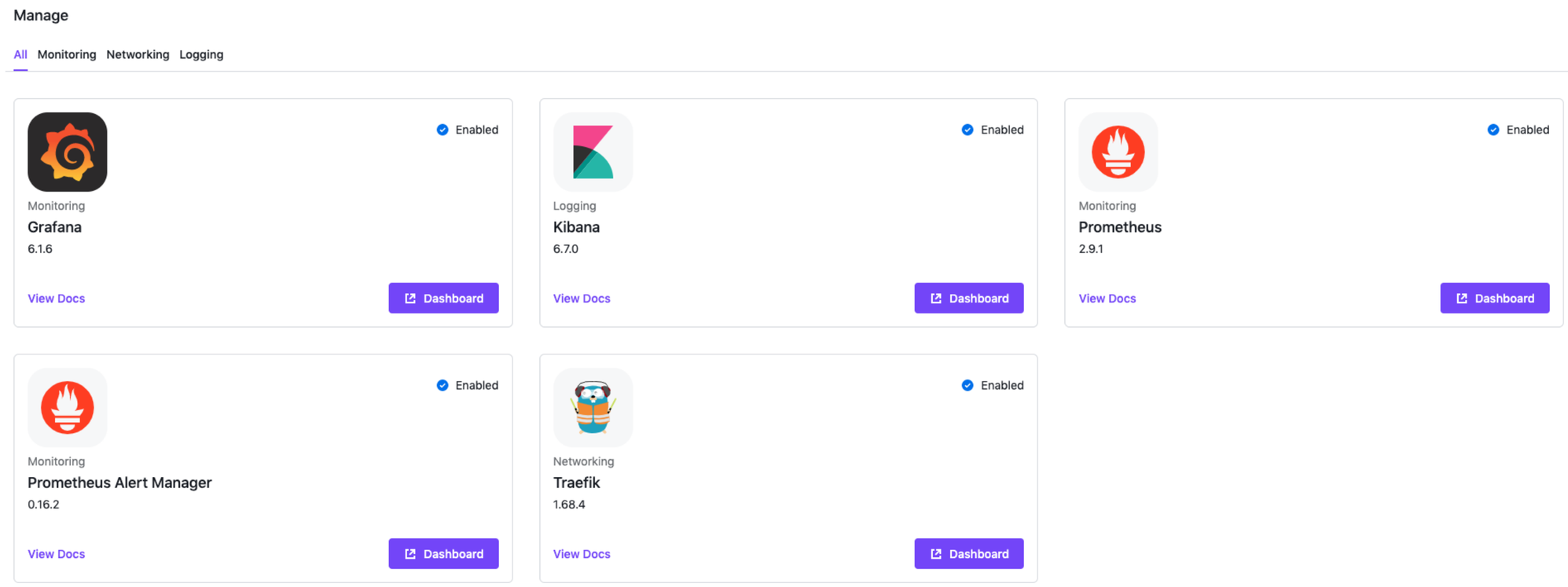
Konvoy Operations

- Operations Portal
- Network: CoreDNS, Calico, MetalLB, Traefik
- Security: Identity Management, SSO, TLS
- Logging: Fluentbit, Elasticsearch, Kibana
- Monitoring and Metrics: Prometheus, Grafana
- Back up and restore: Velero

Operations Portal



Operation Portal Components



Manage

All Monitoring Networking Logging

Monitoring
Grafana
6.1.6
Enabled
View Docs
Dashboard

Logging
Kibana
6.7.0
Enabled
View Docs
Dashboard

Monitoring
Prometheus
2.9.1
Enabled
View Docs
Dashboard

Monitoring
Prometheus Alert Manager
0.16.2
Enabled
View Docs
Dashboard

Networking
Traefik
1.68.4
Enabled
View Docs
Dashboard

Why Traefik?

Why, Mr Anderson?

THE EVOLUTION OF

SOFTWARE ARCHITECTURE

1990's

SPAGHETTI-ORIENTED
ARCHITECTURE
(aka Copy & Paste)

2000's

LASAGNA-ORIENTED
ARCHITECTURE
(aka Layered Monolith)

2010's

RAVIOLI-ORIENTED
ARCHITECTURE
(aka Microservices)

WHAT'S NEXT?

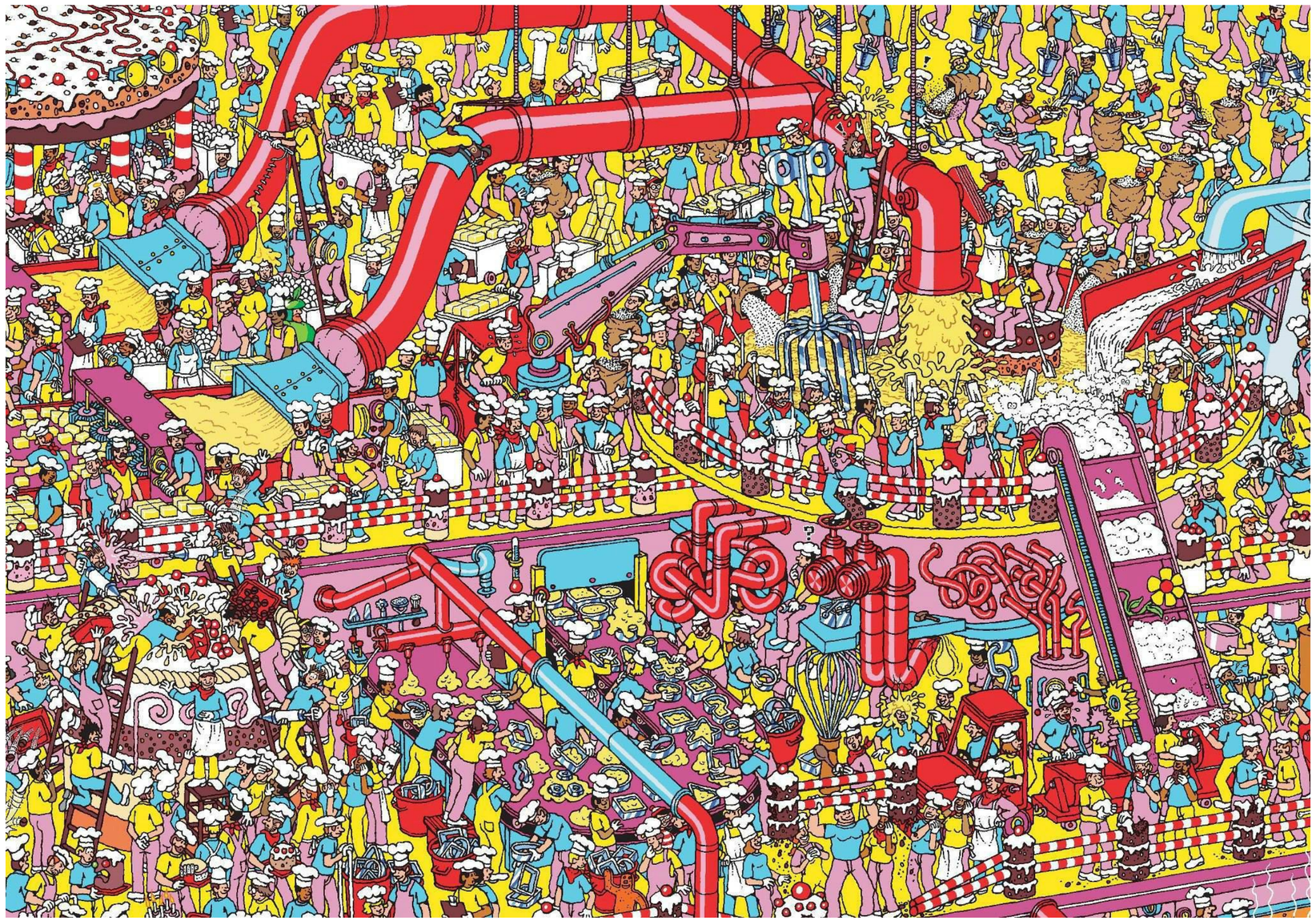
PROBABLY PIZZA-ORIENTED ARCHITECTURE

By @benorama

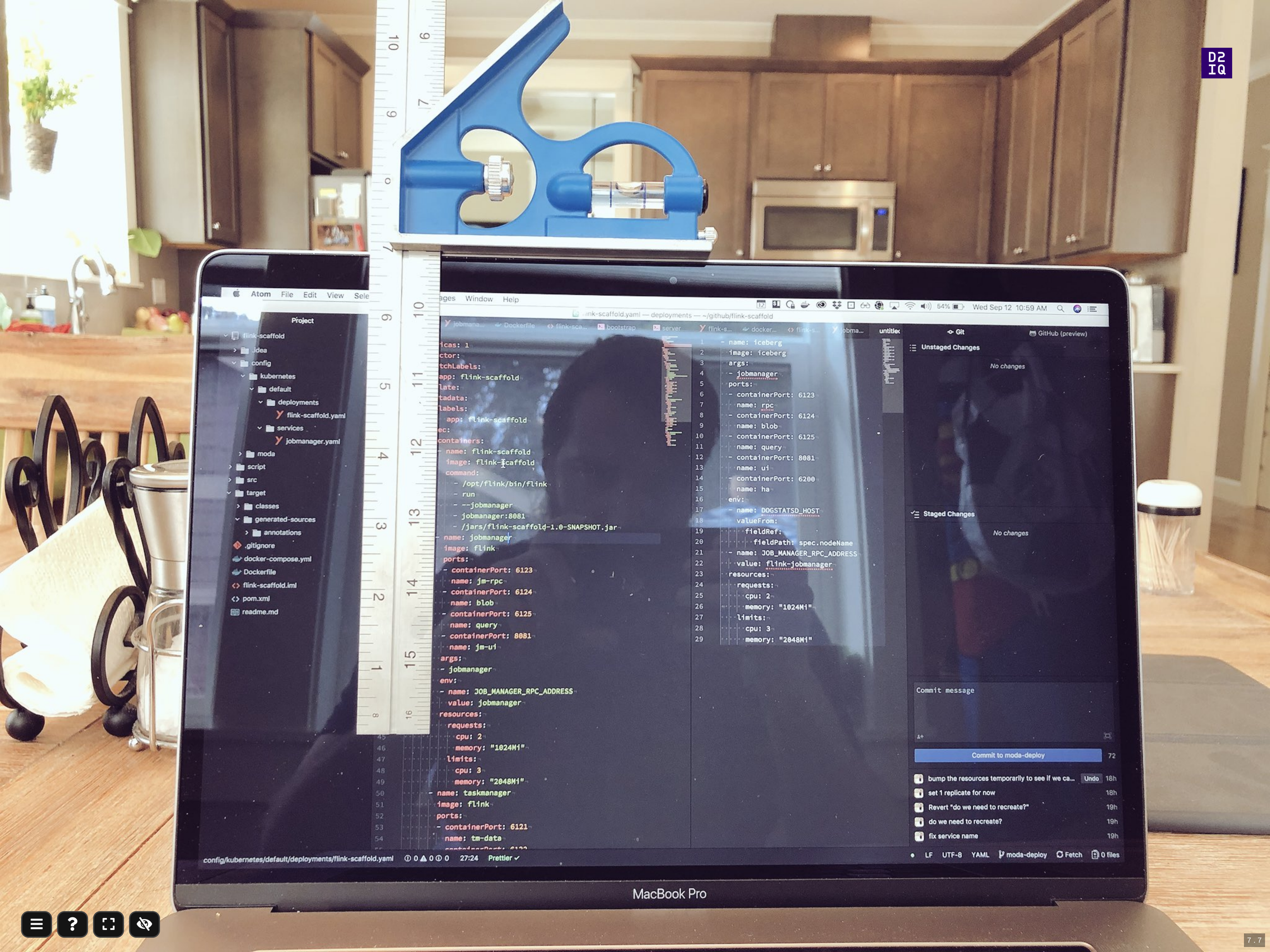
The Premise Of Microservices…

…And What Happens

Where’s My Service?



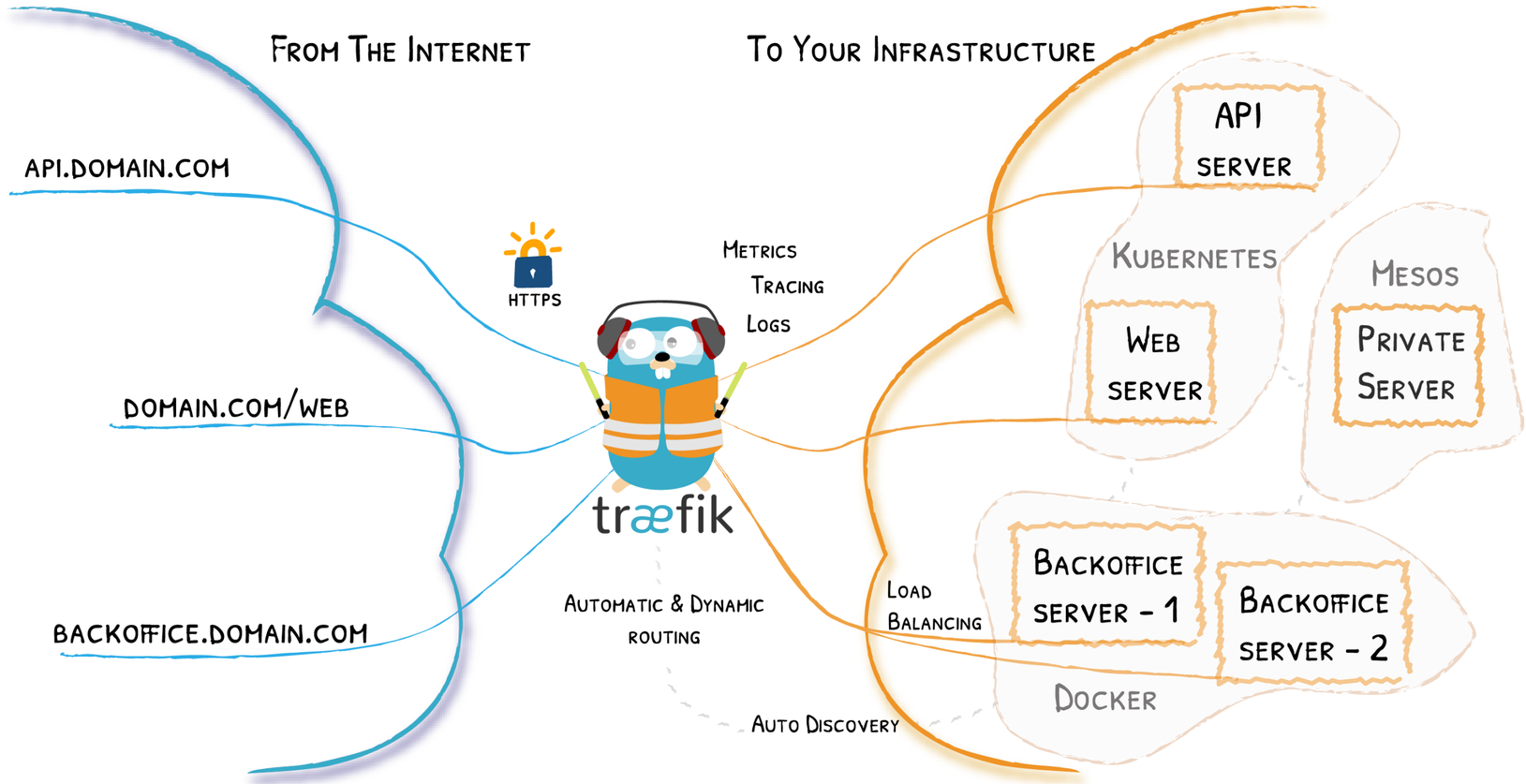
Tools Of The Trade


Project
flink-scaffold
.idea
config
kubernetes
default
deployments
flink-scaffold.yaml
services
jobmanager.yaml
moda
script
src
target
classes
generated-sources
annotations
.gitignore
docker-compose.yml
Dockerfile
flink-scaffold.iml
pom.xml
readme.md
flink-scaffold.yaml — deployments — ~/github/flink-scaffold
Git
GitHub (preview)
Unstaged Changes
No changes
Staged Changes
No changes
Commit message
Commit to moda-deploy
bump the resources temporarily to see if we ca...
set 1 replicate for now
Revert "do we need to recreate?"
do we need to recreate?
fix service name
config/kubernetes/default/deployments/flink-scaffold.yaml
MacBook Pro

What If I Told You?

That You Don’t Have to Write This Configuration File…?

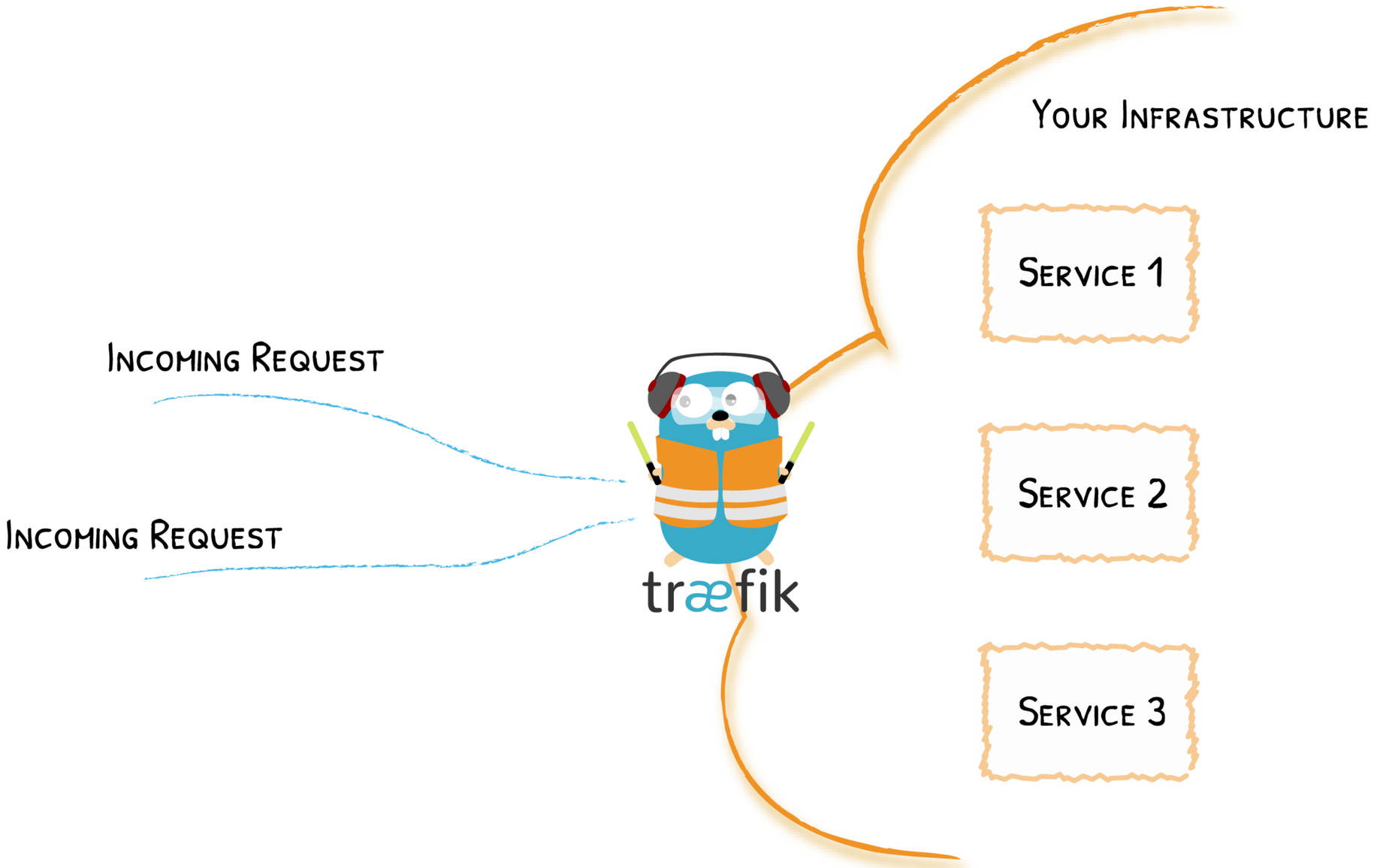
Here Comes Traefik!



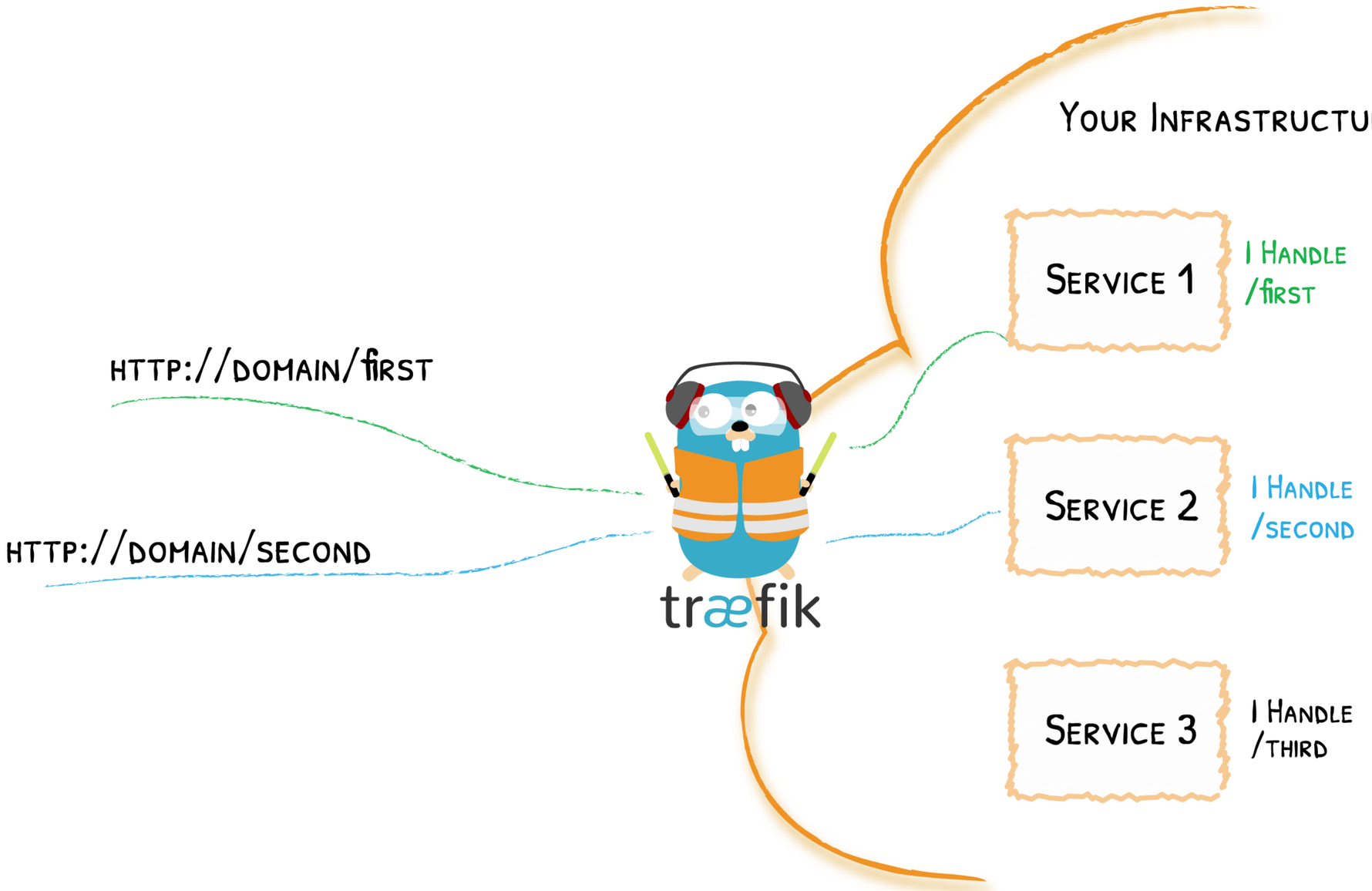
Traefik Project

- https://github.com/containous/traefik
- MIT License
- Written in Go
- 25,000+ ☆ 1B+ ⬇ 400+
- Created in 2015, 4Y
- Current stable branch: `v2.0`

Traefik Is An Edge Proxy



It Dynamically Discovers Services



Traefik With ⎈

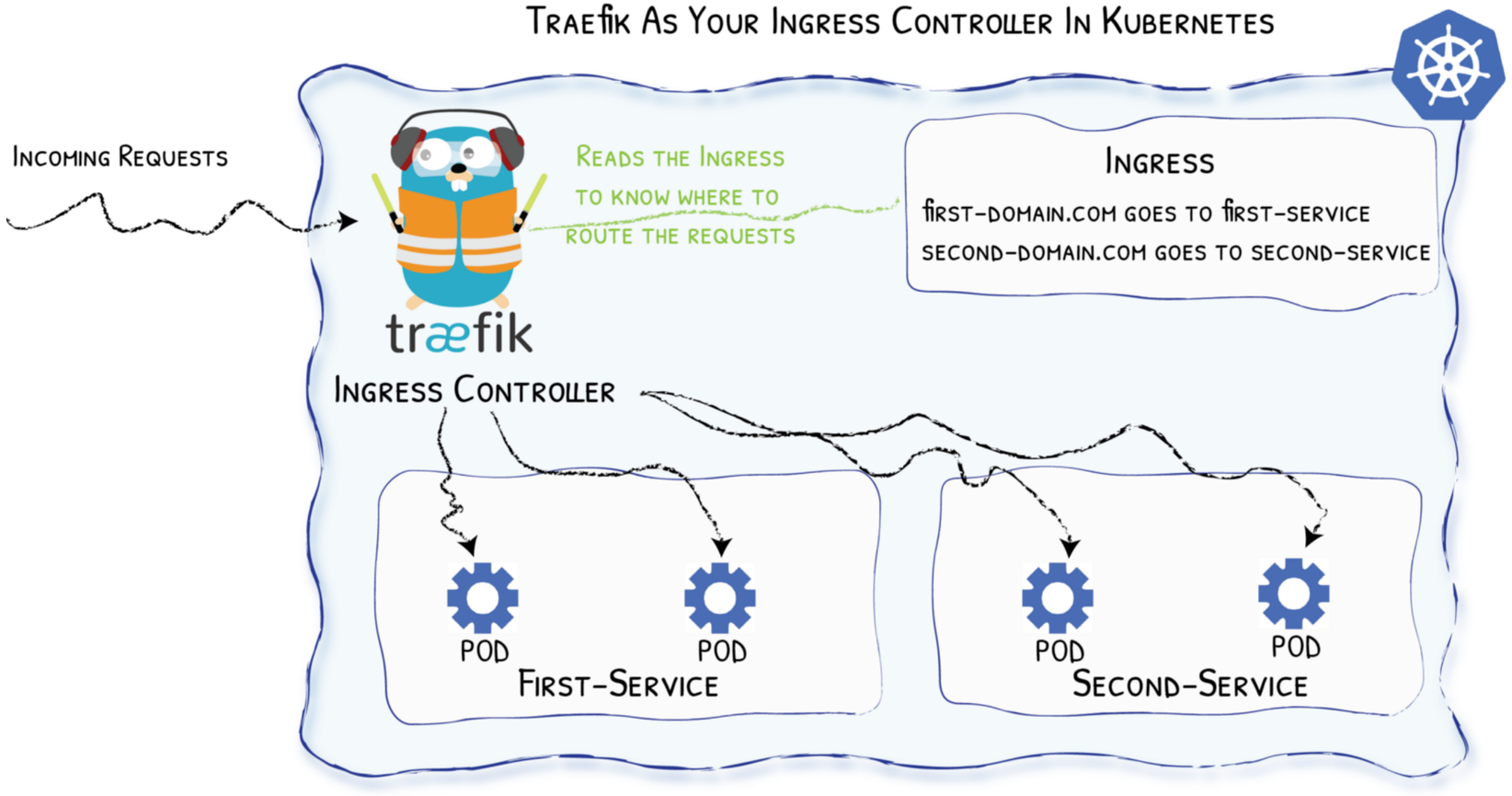


Diagram from https://medium.com/@geraldcroes

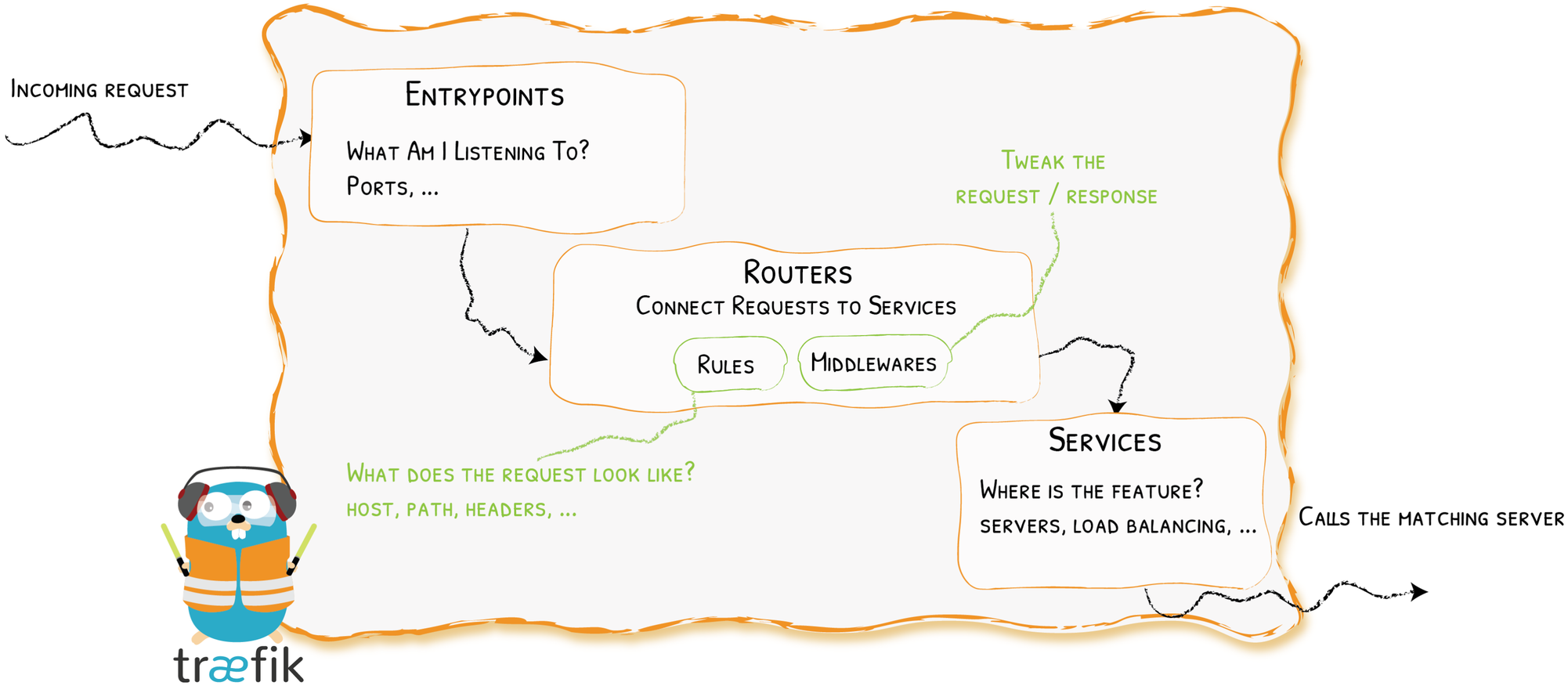
Demo Time!

Konvoy and Traefik v1

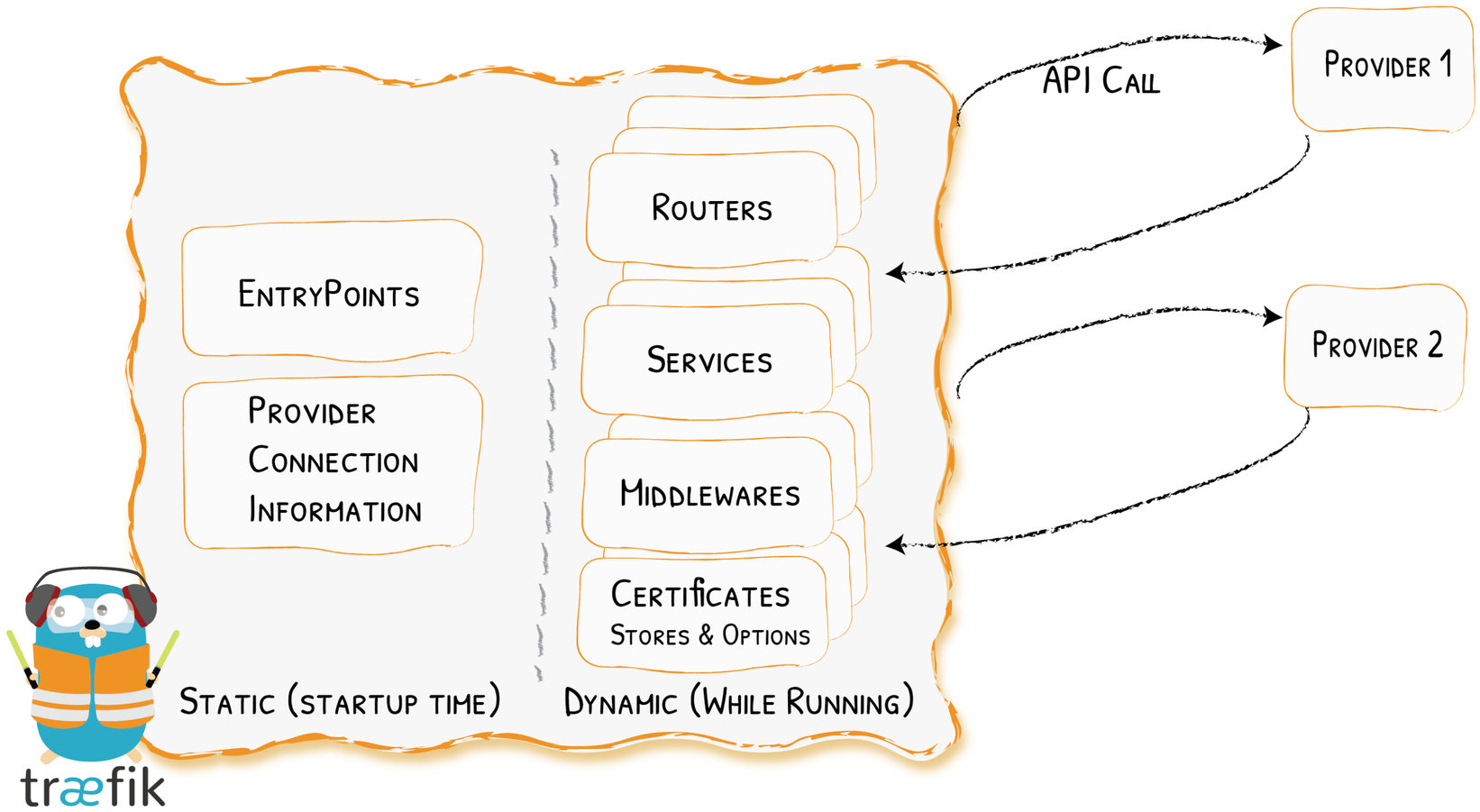
Traefik V2


træfik
2.0
TCP support
Middlewares
Canary / Mirroring
K8S CRD
YAML configuration
Mont d'Or

Architecture At A Glance



Static & Dynamic Configuration



Remember Traefik In ⎈?

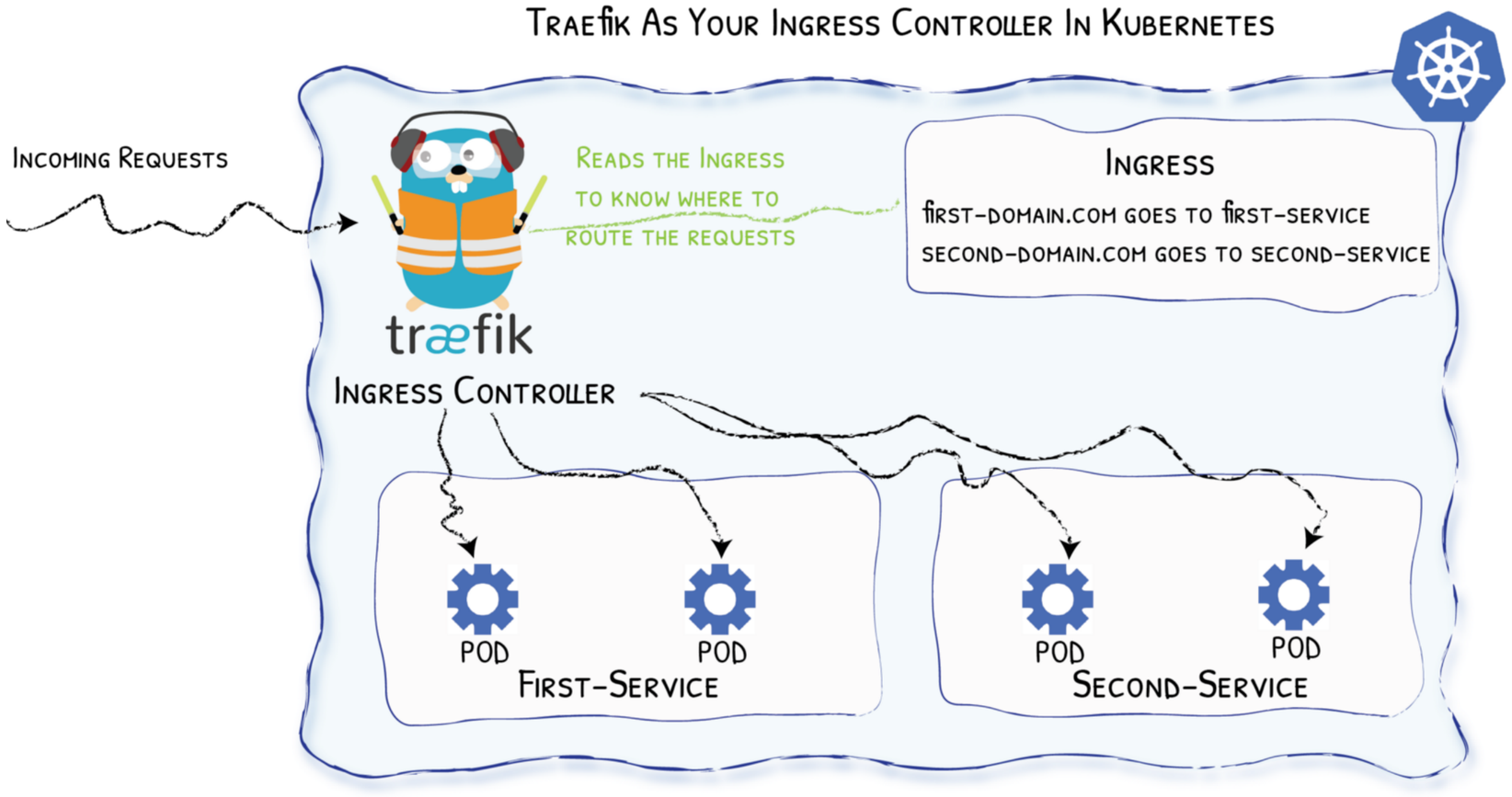


Diagram from https://medium.com/@geraldcroes

But...

Annotations

General annotations

The following general annotations are applicable on the Ingress object:

Annotation	Description
`traefik.ingress.kubernetes.io/app-root: "/index.html"`	Redirects all requests for `/` to the defined path. (1)
`traefik.ingress.kubernetes.io/error-pages: <YML>`	See custom error pages section. (2)
`traefik.ingress.kubernetes.io/frontend-entry-points: http,https`	Override the default frontend endpoints.
`traefik.ingress.kubernetes.io/pass-client-tls-cert: <YML>`	Forward the client certificate following the configuration in YAML. (3)
`traefik.ingress.kubernetes.io/pass-tls-cert: "true"`	Override the default frontend PassTLSCert value. Default: `false` .(DEPRECATED)
`traefik.ingress.kubernetes.io/preserve-host: "true"`	Forward client `Host` header to the backend.
`traefik.ingress.kubernetes.io/priority: "3"`	Override the default frontend rule priority.
`traefik.ingress.kubernetes.io/rate-limit: <YML>`	See rate limiting section. (4)
`traefik.ingress.kubernetes.io/redirect-entry-point: https`	Enables Redirect to another entryPoint for that frontend (e.g. HTTPS).
`traefik.ingress.kubernetes.io/redirect-permanent: "true"`	Return 301 instead of 302.
`traefik.ingress.kubernetes.io/redirect-regex: ^http://localhost/(.*)`	Redirect to another URL for that frontend. Must be set with `traefik.ingress.kubernetes.io/redirect-replacement`.
`traefik.ingress.kubernetes.io/redirect-replacement: http://mydomain/$1`	Redirect to another URL for that frontend. Must be set with `traefik.ingress.kubernetes.io/redirect-regex`.
`traefik.ingress.kubernetes.io/request-modifier: AddPrefix: /users`	Adds a request modifier to the backend request.
`traefik.ingress.kubernetes.io/rewrite-target: /users`	Replaces each matched Ingress path with the specified one, and adds the old path to the `X-Replaced-Path` header.

Annotations

You can add these Kubernetes annotations to specific Ingress objects to customize their behavior.

Tip

Annotation keys and values can only be strings. Other types, such as boolean or numeric values must be quoted, i.e. `"true"`, `"false"`, `"100"`.

Note

The annotation prefix can be changed using the `--annotations-prefix` command line argument, but the default is `nginx.ingress.kubernetes.io`, as described in the table below.

Name	type
nginx.ingress.kubernetes.io/app-root	string
nginx.ingress.kubernetes.io/affinity	cookie
nginx.ingress.kubernetes.io/affinity-mode	"balanced" or "persistent"
nginx.ingress.kubernetes.io/auth-realm	string
nginx.ingress.kubernetes.io/auth-secret	string
nginx.ingress.kubernetes.io/auth-secret-type	string
nginx.ingress.kubernetes.io/auth-type	basic or digest
nginx.ingress.kubernetes.io/auth-tls-secret	string
nginx.ingress.kubernetes.io/auth-tls-verify-depth	number
nginx.ingress.kubernetes.io/auth-tls-verify-client	string
nginx.ingress.kubernetes.io/auth-tls-error-page	string
nginx.ingress.kubernetes.io/auth-tls-pass-certificate-to-upstream	"true" or "false"
nginx.ingress.kubernetes.io/auth-url	string
nginx.ingress.kubernetes.io/auth-cache-key	string

⎈ CRD - Custom Resources Definition

```yaml
# File "webapp.yaml"
apiVersion: traefik.containo.us/v1alpha1
kind: IngressRoute
metadata:
  name: simpleingressroute
spec:
  entryPoints:
    - web
  routes:
  - match: Host(`localhost`) && PathPrefix(`/whoami`)
    kind: Rule
    services:
    - name: webapp
      port: 80
```

```
$ kubectl apply -f webapp.yaml
$ kubectl get ingressroute
```

⎈ & TCP (With CRD)

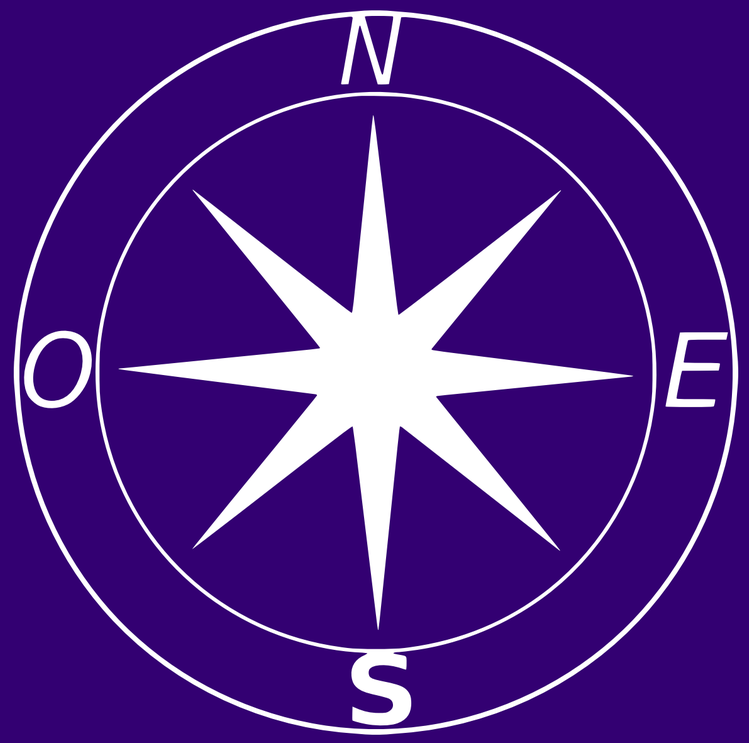
```yaml
apiVersion: traefik.containo.us/v1alpha1
kind: IngressRouteTCP
metadata:
  name: ingressroutetcpmongo.crd
spec:
  entryPoints:
    - mongotcp
  routes:
  - match: HostSNI(`mongo-prod`)
    services:
    - name: mongo-prod
      port: 27017
```

Demo Time (2)!

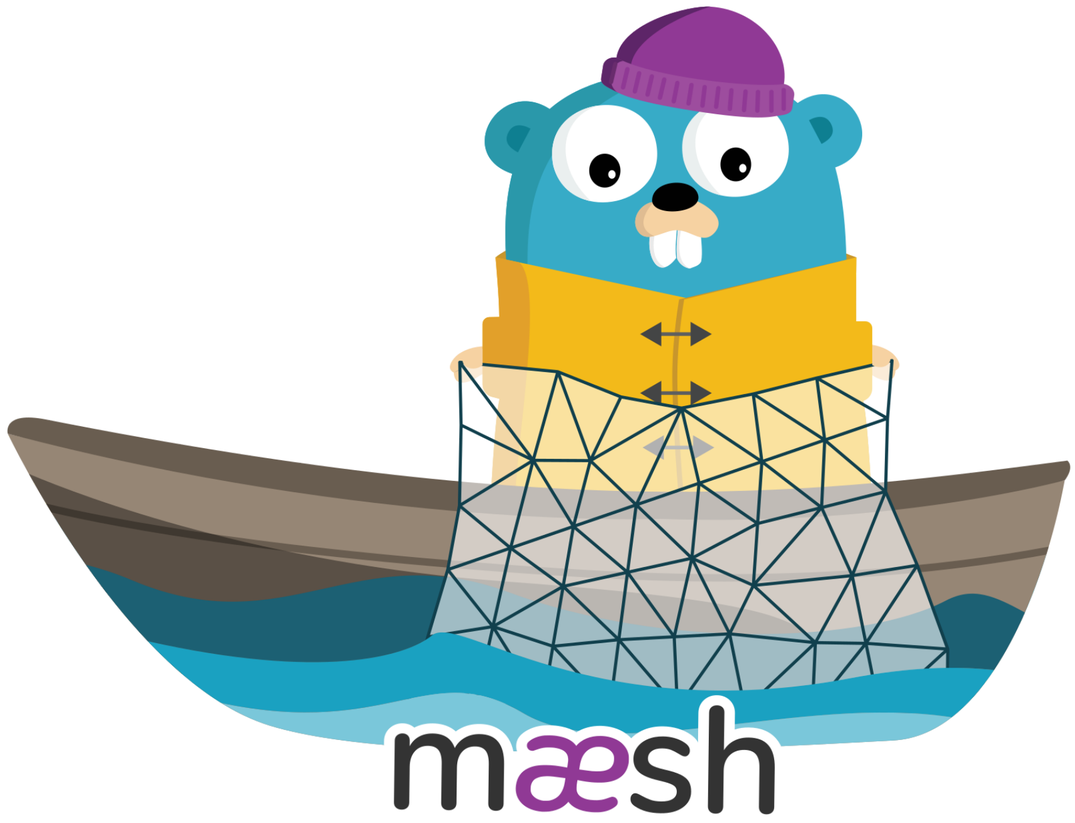
Traefik v2 in Konvoy

East / West Traefik

What about routing traffic from service to services?



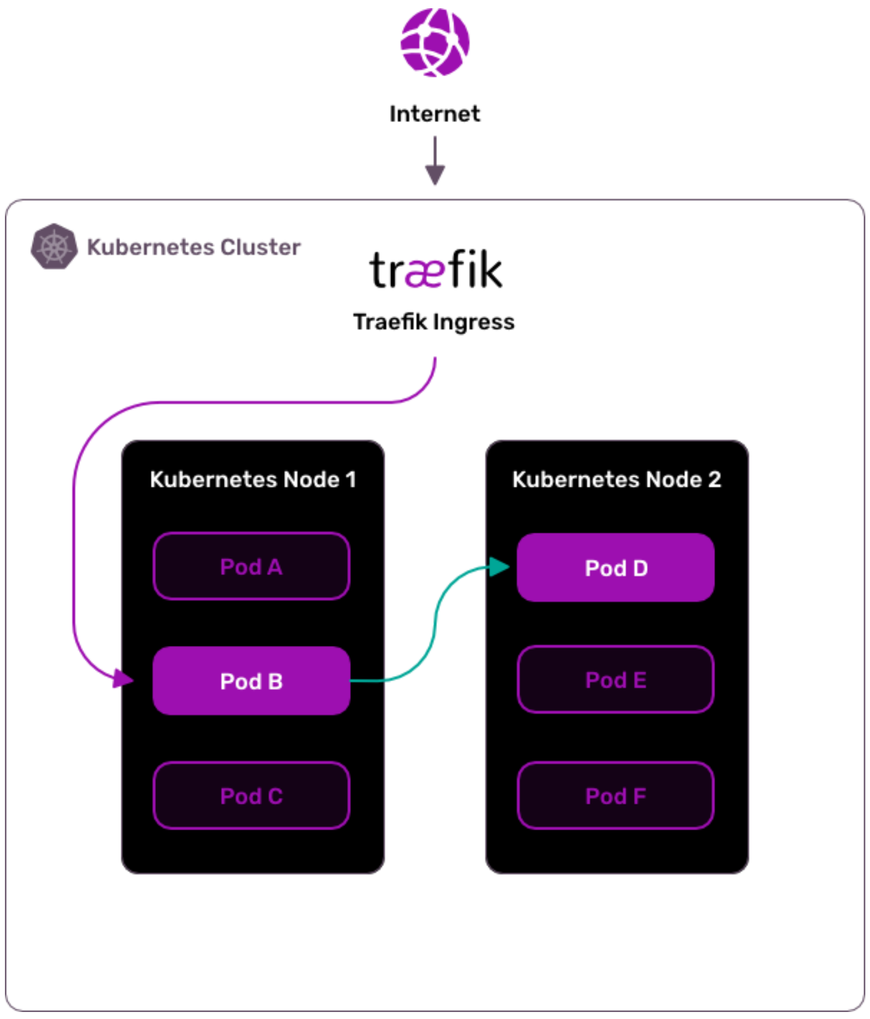
Say Hello To Maesh

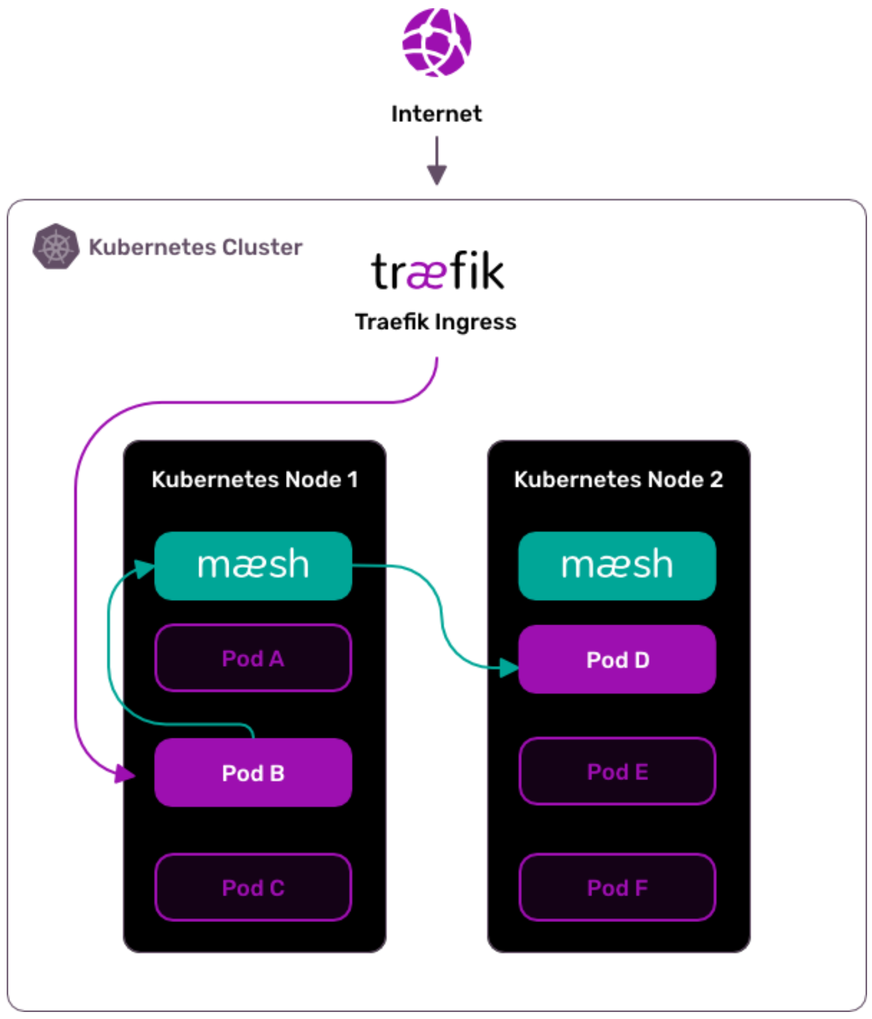


What Is Maesh?

Maesh is a lightweight, easy to configure, and non-invasive service mesh that allows visibility and management of the traffic flows inside any Kubernetes cluster.

Maesh Architecture





More On Maesh

Maesh Website

Show Me The Code!

- Install Maesh (Helm Chart):

```
helm repo add maesh https://containous.github.io/maesh/charts
helm repo update
helm install --name=maesh --namespace=maesh maesh/maesh --values=./maesh/values.yaml
```

- Deploy Applications:

```
kubectl apply -f apps/0-namespace.yaml
kubectl apply -f apps/1-svc-accounts.yaml
kubectl apply -f apps/2-apps-client.yaml
kubectl apply -f apps/3-apps-servers.yaml
kubectl apply -f apps/4-ingressroutes.yaml
```

- Deploy SMI Objects to allow traffic in the mesh:

```
kubectl apply -f apps/5-smi-http-route-groups.yaml
kubectl apply -f apps/6-smi-traffic-targets.yaml
```

A Closer Look To SMI Objects

```yaml
apiVersion: specs.smi-spec.io/v1alpha1
kind: HTTPRouteGroup
metadata:
  name: app-routes
  namespace: apps
matches:
- name: all
  pathRegex: "/"
  methods: ["*"]
---
apiVersion: access.smi-spec.io/v1alpha1
kind: TrafficTarget
metadata:
  name: client-apps
  namespace: apps
destination:
  kind: ServiceAccount
  name: apps-server
  namespace: apps
specs:
- kind: HTTPRouteGroup
  name: app-routes
  matches:
  - all
sources:
- kind: ServiceAccount
  name: apps-client
  namespace: apps
```

Demo Time (3)!

Maesh in Konvoy

That’s All Folks!

Thank You!

@DamienDuportal

dduportal

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